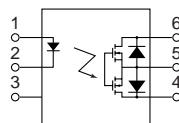
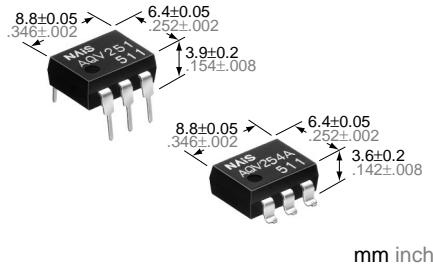


NAiS

**HE (High-function Economy)
Type
[1-Channel (Form A) Type]**

PhotoMOS RELAYS

FEATURES



1. Highly sensitive and low on-resistance
2. Controls various types of loads such as relays, motors, lamps and solenoids.
3. Optical coupling for extremely high isolation
5,000 Vrms I/O isolation available.
4. Low-level off state leakage current
5. Eliminates the need for a power supply to drive the power MOSFET
A power supply used to drive the power MOSFET is unnecessary because of the built-in optoelectronic device. This results in easy circuit design and small PC board area.
6. Low thermal electromotive force (Approx. 1 µV)

TYPICAL APPLICATIONS

- High-speed inspection machines
- Telephone equipment
- Data communication equipment

TYPES

1. I/O isolation voltage: 1,500 V AC

Output rating*		Part No.				Packing quantity	
		Through hole terminal	Surface-mount terminal				
Load voltage	Load current	Tube packing style		Tape and reel packing style		Tube	Tape and reel
				Picked from the 1/2/3-pin side	Picked from the 4/5/6-pin side		
40 V	500 mA	AQV251	AQV251A	AQV251AX	AQV251AZ	1 tube contains 50 pcs. 1 batch contains 500 pcs.	1,000 pcs.
60 V	400 mA	AQV252	AQV252A	AQV252AX	AQV252AZ		
100 V	350 mA	AQV255	AQV255A	AQV255AX	AQV255AZ		
200 V	250 mA	AQV257	AQV257A	AQV257AX	AQV257AZ		
250 V	200 mA	AQV253	AQV253A	AQV253AX	AQV253AZ		
400 V	150 mA	AQV254	AQV254A	AQV254AX	AQV254AZ		
1,000 V	30 mA	AQV259	AQV259A	AQV259AX	AQV259AZ		
1,500 V	20 mA	AQV258	AQV258A	AQV258AX	AQV258AZ		

2. I/O isolation voltage: Reinforced 5,000 V

Output rating*		Part No.				Packing quantity	
		Through hole terminal	Surface-mount terminal				
Load voltage	Load current	Tube packing style		Tape and reel packing style		Tube	Tape and reel
				Picked from the 1/2/3-pin side	Picked from the 4/5/6-pin side		
250 V	200 mA	AQV253H	AQV253HA	AQV253HAX	AQV253HAZ	1 tube contains 50 pcs. 1 batch contains 500 pcs.	1,000 pcs.
400 V	150 mA	AQV254H	AQV254HA	AQV254HAX	AQV254HAZ		

*Indicate the peak AC and DC values.

Note: For space reasons, the package type indicator "X" and "Z" are omitted from the seal.

RATING

1. Absolute maximum ratings (Ambient temperature: 25°C 77°F)

Item		Symbol	Type of connection	AQV251(A)	AQV252(A)	AQV255(A)	AQV257(A)	AQV253(A)	AQV254(A)	AQV259(A)	AQV258(A)	AQV253H(A)	AQV254H(A)	Remarks
Input	LED forward current	I _F		50 mA										
	LED reverse voltage	V _R		3 V										
	Peak forward current	I _{FP}		1 A										f = 100 Hz, Duty factor +0.1%
	Power dissipation	P _{in}		75 mW										
Output	Load voltage (peak AC)	V _L		40 V	60 V	100 V	200 V	250 V	400 V	1,000 V	1,500 V	250 V	400 V	
	Continuous load current	I _L		A	0.5 A	0.4 A	0.35 A	0.25 A	0.2 A	0.15 A	0.03 A	0.02 A	0.2 A	0.15 A
				B	0.7 A	0.6 A	0.45 A	0.35 A	0.3 A	0.18 A	0.04 A	0.025 A	0.3 A	0.18 A
	Peak load current	I _{peak}		C	1.0 A	0.8 A	0.70 A	0.5 A	0.4 A	0.25 A	0.05 A	0.04 A	0.4 A	0.25 A
Power dissipation		P _{out}	360 mW											
Total power dissipation		P _T	410 mW											
I/O isolation voltage		V _{iso}	1,500 V AC										5,000 V AC	
Temperature limits	Operating	T _{opr}	−40°C to +85°C −40°F to +185°F										Non-condensing at low temperatures	
	Storage	T _{stg}	−40°C to +100°C −40°F to +212°F											

2. Electrical characteristics (Ambient temperature: 25°C 77°F)

Item		Symbol	Type of connection	AQV251(A)	AQV252(A)	AQV255(A)	AQV257(A)	AQV253(A)	AQV254(A)	AQV259(A)	AQV258(A)	AQV253H(A)	AQV254H(A)	Condition	
Input	LED operate current	Typical Maximum	I _{Fon}	0.9 mA										1.4 mA	
				3 mA										I _L = Max.	
	LED turn off current	Minimum Typical	I _{loff}	0.4 mA										I _L = Max.	
				0.8 mA										1.3 mA	
Output	LED dropout voltage	Typical Maximum	V _F	1.14 V (1.25 V at I _F = 50 mA)										I _F = 5 mA	
				1.5 V											
	On resistance	Typical Maximum	R _{on}	A	0.6 Ω	0.74 Ω	1.8 Ω	2.6 Ω	5.5 Ω	12.4 Ω	85 Ω	345 Ω	5.5 Ω	12.4 Ω	
					1 Ω	1.4 Ω	2.5 Ω	4 Ω	8 Ω	16 Ω	200 Ω	500 Ω	8 Ω	16 Ω	
		Typical Maximum	R _{on}		0.3 Ω	0.37 Ω	0.9 Ω	1.4 Ω	2.7 Ω	6.2 Ω	60 Ω	345 Ω	2.7 Ω	6.2 Ω	
					0.5 Ω	0.7 Ω	1.25 Ω	2 Ω	4 Ω	8 Ω	100 Ω	500 Ω	4 Ω	8 Ω	
		Typical Maximum	R _{on}	C	0.15 Ω	0.18 Ω	0.45 Ω	0.7 Ω	1.4 Ω	3.1 Ω	30 Ω	160 Ω	1.4 Ω	3.1 Ω	
					0.25 Ω	0.35 Ω	0.63 Ω	1 Ω	2 Ω	4 Ω	50 Ω	250 Ω	2 Ω	4 Ω	
Transfer characteristics	Off state leakage current	Maximum	—	—	1 μA						10 μA	1 μA			
	Switching speed	Turn on time* Turn off time*	T _{on}	—	1.7 ms	1.4 ms	0.9 ms	1.5 ms	0.8 ms	0.8 ms	0.6 ms	0.35 ms	2.4 ms	1.8 ms	
					3 ms	2 ms	3 ms	2 ms	1 ms	1 ms	4 ms	3 ms			
	I/O capacitance	Typical Maximum	C _{iso}		0.07 ms 0.09 ms 0.1 ms 0.06 ms 0.05 ms 0.2 ms 0.04 ms 0.06 ms 0.05 ms										
			1.3 pF 3 pF										f = 1 MHz V _B = 0		
	Initial I/O isolation resistance	Minimum	R _{iso}	—	1,000 MΩ										500 V DC

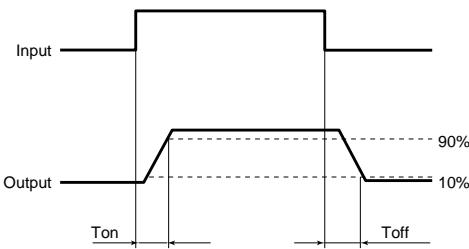
Note: Recommendable LED forward current

For type of connection, see Page 31.

Standard type: 5 mA

Reinforced type: 5 to 10 mA

*Turn on/Turn off time



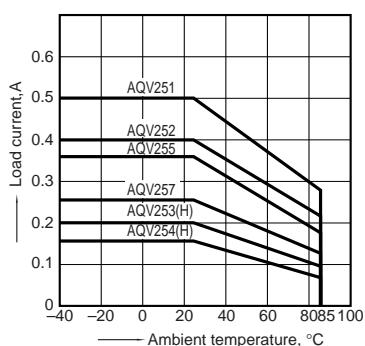
- For Dimensions, see Page 27.
- For Schematic and Wiring Diagrams, see Page 31.
- For Cautions for Use, see Page 36.

REFERENCE DATA

1.-{(1)} Load current vs. ambient temperature characteristics

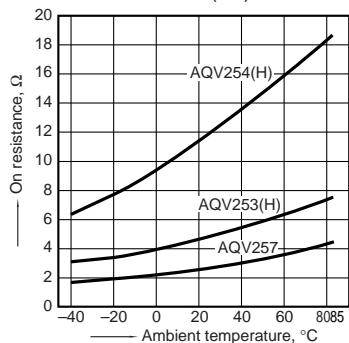
Allowable ambient temperature: -40°C to $+85^{\circ}\text{C}$
 -40°F to $+185^{\circ}\text{F}$;

Type of connection: A



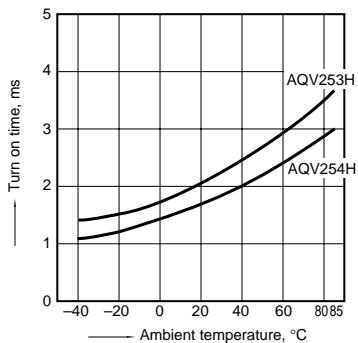
2.-{(2)} On resistance vs. ambient temperature characteristics

Measured portion: between terminals 4 and 6;
LED current: 5 mA;
Continuous load current: Max. (DC)



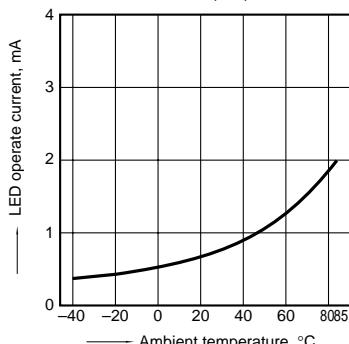
3.-{(2)} Turn on time vs. ambient temperature characteristics

LED current: 5 mA; Load voltage: Max. (DC);
Continuous load current: Max. (DC)



5.-{(1)} LED operate current vs. ambient temperature characteristics

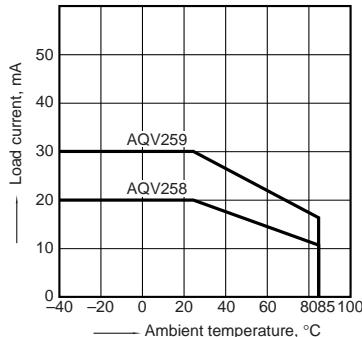
Sample: AQV251, AQV252, AQV253, AQV254, AQV259; Load voltage: Max. (DC);
Continuous load current: Max. (DC)



1.-{(2)} Load current vs. ambient temperature characteristics

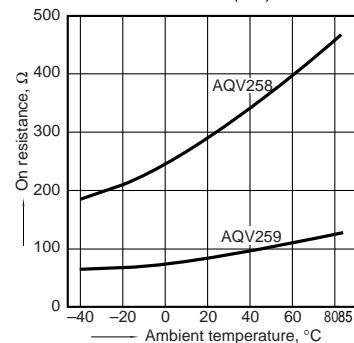
Allowable ambient temperature: -40°C to $+85^{\circ}\text{C}$
 -40°F to $+185^{\circ}\text{F}$;

Type of connection: A



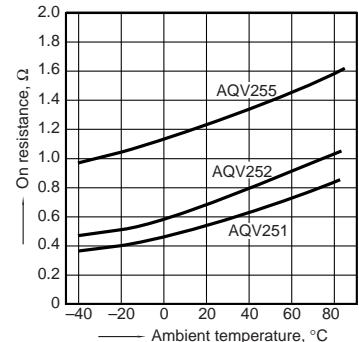
2.-{(3)} On resistance vs. ambient temperature characteristics

Measured portion: between terminals 4 and 6;
LED current: 5 mA;
Continuous load current: 30 mA (DC)



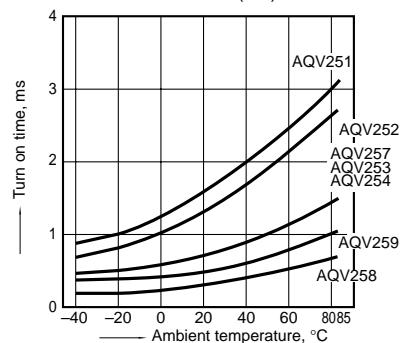
2.-{(1)} On resistance vs. ambient temperature characteristics

Measured portion: between terminals 4 and 6;
LED current: 5 mA;
Continuous load current: Max. (DC)



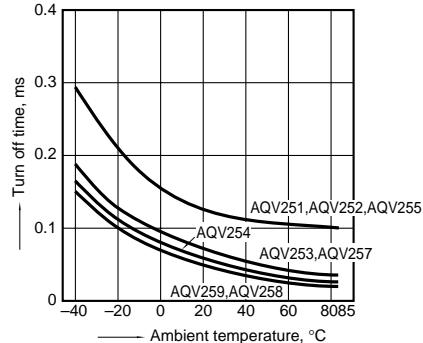
3.-{(1)} Turn on time vs. ambient temperature characteristics

LED current: 5 mA;
Load voltage: Max. (DC);
Continuous load current: Max. (DC)



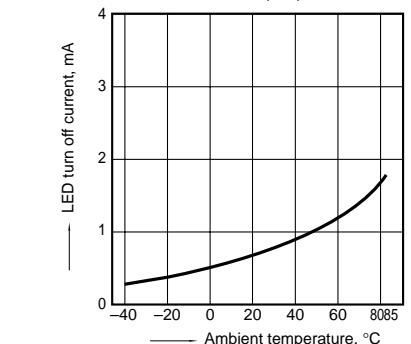
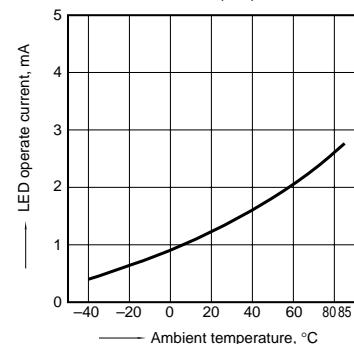
4.-{(1)} Turn off time vs. ambient temperature characteristics

LED current: 5 mA; Load voltage: Max. (DC);
Continuous load current: Max. (DC)



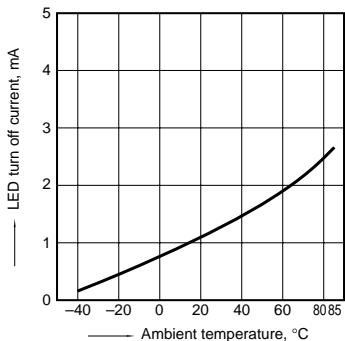
5.-{(1)} LED operate current vs. ambient temperature characteristics

Sample: AQV251, AQV252, AQV253, AQV254, AQV259; Load voltage: Max. (DC);
Continuous load current: Max. (DC)

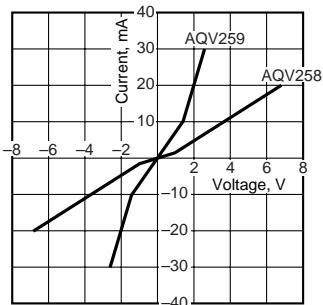


AQV25O

6. -(2) LED turn off current vs. ambient temperature characteristics
 Sample: AQV251, AQV252, AQV253, AQV254, AQV259; Load voltage: Max. (DC); Continuous load current: Max. (DC)

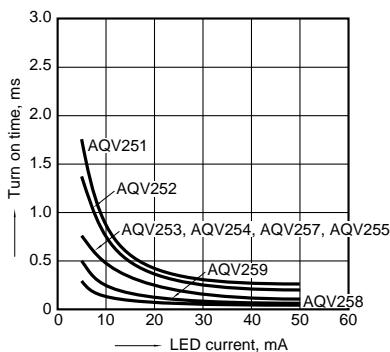


8.-(2) Voltage vs. current characteristics of output at MOS portion
 Sample: AQV259
 Measured portion: between terminals 4 and 6;
 Ambient temperature: 25°C 77°F



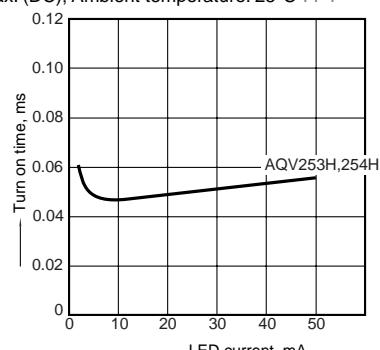
10-(1). LED forward current vs. turn on time characteristics

Measured portion: between terminals 4 and 6;
 Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F

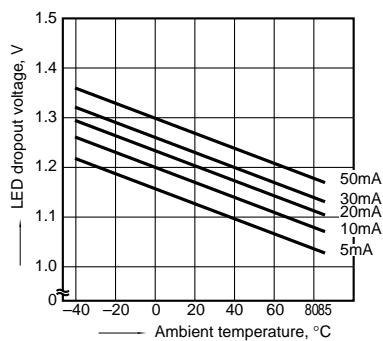


11-(2). LED forward current vs. turn off time characteristics

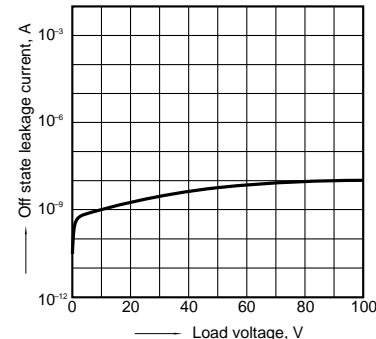
Measured portion: between terminals 4 and 6;
 Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



7. LED dropout voltage vs. ambient temperature characteristics
 LED current: 5 to 50 mA

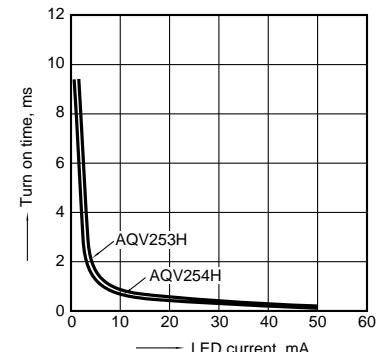


9-(1). Off state leakage current
 Sample: AQV259;
 Measured portion: between terminals 4 and 6;
 Ambient temperature: 25°C 77°F



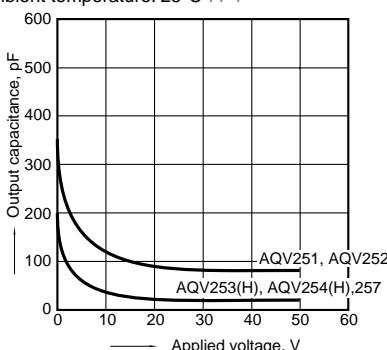
10-(2). LED forward current vs. turn on time characteristics

Measured portion: between terminals 4 and 6;
 Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F

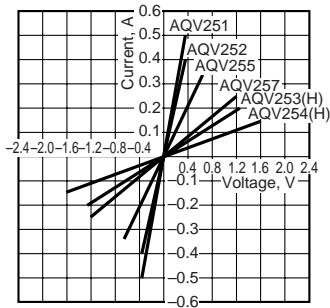


12.-(1) Applied voltage vs. output capacitance characteristics

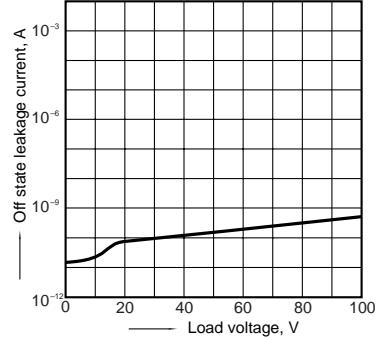
Measured portion: between terminals 4 and 6;
 Frequency: 1 MHz;
 Ambient temperature: 25°C 77°F



8.-(1) Voltage vs. current characteristics of output at MOS portion
 Measured portion: between terminals 4 and 6;
 Ambient temperature: 25°C 77°F

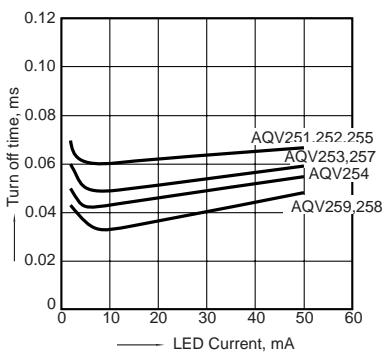


9-(2). Off state leakage current
 Sample: AQV254H;
 Measured portion: between terminals 4 and 6;
 Ambient temperature: 25°C 77°F



11-(1). LED forward current vs. turn off time characteristics

Measured portion: between terminals 4 and 6;
 Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



12.-(2) Applied voltage vs. output capacitance characteristics

Sample: AQV259;
 Measured portion: between terminals 4 and 6;
 Frequency: 1 MHz; Ambient temperature: 25°C 77°F

